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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/728,027  | 12/04/2003  | Angshuman Bezbarua   | VRT0090P1US         | 8352             |
| 60429   | 7590        | 07/24/2008           | EXAMINER            |                  |
| CAMPBELL STEPHENSON LLP<br>11401 CENTURY OAKS TERRACE<br>BLDG. H, SUITE 250<br>AUSTIN, TX 78758 |             |                      |                     | CYGIEL, GARY W   |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/728,027             | BEZBARUAH ET AL.    |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | GARY W. CYGIEL         | 2188                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 08 May 2008.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-9 and 18-28 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-9 and 18-28 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
     1. Certified copies of the priority documents have been received.  
     2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____ .                        |

## DETAILED ACTION

### Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08 May 2008 has been entered.

### Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-9 and 18-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gabber et al. (US PGPub 2003/0145179 A1) in view of Duprey et al. (US Patent No. 6,671,705).

Consider **Claims 1,18, and 23,**

Gabber teaches a method/system comprising:

a processor for executing instructions (Gabber:Fig 1:Item 103, host computer),  
and

a memory to store the instructions (Gabber:Fig 1:Item 103, host computer),  
wherein the instructions comprise

identifying instructions to identify a plurality of secondary nodes, wherein  
said identifying comprises sending an update from a primary node to said  
plurality of nodes (Gabber:Fig 2:Item 203, system identifies storage elements  
(secondary nodes).). Gabber does not explicitly disclose using a log to maintain  
updates.

sending instructions to send a notification to each of the plurality of secondary nodes once all of the plurality of secondary nodes have acknowledged the update (Gabber:~~¶0027,WriteAll;WaitAll~~ policy. Host element acknowledges the operation after all storage elements confirm. ¶0016, SCSI protocol is used. In the SCSI protocol the “/ACK” (acknowledge) signal is a notification sent to end a request/acknowledge handshake. This would be sent to each of the plurality of nodes after all nodes have confirmed the update (write). See attached document describing SCSI operation.); and

determining that all of the plurality of secondary nodes have acknowledged the update (Gabber:~~¶0027, WriteAll;WaitAll~~).

Gabber does not explicitly recite using a log to maintain updates. However, Duprey does these elements, including:  
wherein at least one secondary node of the plurality of secondary nodes inserts the update in a respective log of updates, and each respective log of updates corresponds to a respective copy of the data (Duprey:Col 6:Lines 35-43 explain that each logical unit is associated with a storage processor (SP) and further Col 6:Lines 62-67 each SP maintains a write cache. Col 7:Lines 1-29 detail that the write log is maintained on both SP's to protect against failure. The write intent log is a log of updates and the two SPs are considered a plurality of secondary nodes

Gabber and Duprey are related art solving similar problems such that they are both directed towards improvements in back-up system design through multiple remote mirrors/copies.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to implement the steps as taught by Duprey in the system of Gabber because keeping track of the updates and notifying each mirror of the status of the other mirrors provides an exceptionally robust fail-over system in comparison to Gabber alone.

**Consider Claims 2, 19 and 24,**

The combination of Gabber and Duprey teaches the method/system of claim 2 wherein the instructions further comprise: clearing instructions to clear the update from the respective log of updates in response to receiving the notification (Duprey:Col 6:Lines 35-43, each LU is owned and accessed by only one SP. Col 15:Line 79-Col 16:Line 46, logic is free to remove write entry from write intent log after the update and after testing to ensure no mirrors need the update which occurs after or in response to the notification being sent indicating all mirrors are synchronized.).

**Consider Claims 3 and 20,**

The combination of Gabber and Duprey teaches the method/system of claim 2 wherein clearing the update from the respective log comprises updating a start-of-log pointer in the respective log (Gabber ¶0025 describes using a queue with pointers for each storage element. Further described is that messages are taken off the queue (cleared) and sends them to the storage element. This requires updating the pointers in each queue whatever the title of the pointer may be.).

**Consider Claims 4 and 21,**

The combination of Gabber and Duprey teaches the method/system of claim 2 wherein the clearing the update from the respective log comprises updating a pointer to a location in the respective log, wherein the pointer points to the location if the location contains a next update to clear (As described above, the pointer is updated when it is taken from the queue therefore it was pointing at the next update just prior to it being cleared.).

**Consider Claims 5, 22, and 25,**

The combination of Gabber and Duprey teaches the method/system of claim 23 wherein the instructions further comprise

determining instructions to determine that a location of a next update in a first respective log of updates to a first respective copy of the data at a first secondary node of the secondary nodes differs from a corresponding location of the next update in a second respective log of updates to a second respective copy of the data at a second secondary node of the secondary nodes (Gabber ¶0024, a determination is made as to whether a particular storage element has up to date data.); and

second identifying instructions to identify a set of updates in the first respective log, wherein each update of the set of updates is not in the second respective log (Gabber:Fig 6:Item 610, getting missed information requires identifying and defining

updates which are present in the ACTIVE storage element and not present in the second storage element.); and

synchronizing instructions to synchronize the first respective copy and the second respective copy by applying the set of updates to the second respective copy (Gabber ¶0024, if it is determined that a storage element is not up to date then it is instructed to recover from another storage element. Gabber:Fig 6:Item 610, getting missed information is the same as applying the set of updates that differ between the first and second storage elements.).

**Consider Claim 6,**

The combination of Gabber and Duprey teaches the method of claim 1 wherein the determining occurs when a primary node maintaining the data fails (Gabber ¶0028-0030 describes a system which allows for failure and swaps to a second host element to act as the primary. The determining occurs at all times including when a primary node fails.).

**Consider Claim 7,**

The combination of Gabber and Duprey teaches the method of claim 1 further comprising: setting a sent indicator for the update for one of the plurality of secondary nodes when the update is sent to the one secondary node (Duprey:Col 11:Line 63-Col 12:Line 30, describes that image data contains a mirror image state which acts as an

indicator indicating sent status of updates (i.e. synchronized, unsynchronized and synchronizing)).

**Consider Claim 8,**

The combination of Gabber and Duprey teaches the method of claim 7 further comprising: setting a received indicator for the update for the one secondary node when an acknowledgement of the update is received from the one secondary node (Duprey:Col 11:Line 63-Col 12:Line 30, describes that image data contains a mirror image state which acts as an indicator indicating received status of updates (i.e. synchronized, unsynchronized and synchronizing)).

**Consider Claim 9,**

The combination of Gabber and Duprey teaches the method of claim 8 wherein the sending the notification to each of the plurality of secondary nodes comprises determining that a respective sent indicator and a respective received indicator for the update are set for each of the plurality of secondary nodes (Duprey:Col 9 details the status changes that the mirrors go through whenever writes take place. This information is contained on each mirror Col 10:Lines 53-64. These state updates (notifications) are sent as each mirror changes state including a final update after the last mirror has acknowledged the update. Since the update includes the status (i.e. synchronized, unsynchronized and synchronizing) the status of the state (sent/received indicator) must be determined when sending the notification.).

**Consider Claims 26-28**

The combination of Gabber and Duprey further teaches:

incrementing instructions to increment a regional counter stored on the primary node by a number of secondary nodes to which the update is sent, in response to the identifying (¶0026, determines how many responses should be received. ¶0027, Write All;Wait Quorum policy indicates that response is sent after a predetermined number of confirmations. This requires a counter.); and

determining instructions to determine that each of the plurality of secondary nodes has acknowledged the update (Gabber:¶0027, WriteAll;WaitAll).

Although Gabber does teach the use of a counter (¶0026 and 0027) there is no explicit disclosure of how this counter operates. However, there are only a finite number of ways of operating on a counter these are either incrementing or decrementing the counter. Gabber teaches a Write All;Wait Quorum policy that must somehow track the number of confirmation. This can be done by incrementing or decrementing until a set value is reached. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the counter of Gabber in such a manner that the regional counter is a number of secondary nodes from which an acknowledgement to the update has not been received; and

decrementing instructions executable for decrementing the regional counter in response to receiving an acknowledgement from a secondary node among the plurality of secondary nodes to which the update is sent because these are simply selected from

a small finite set of choices that produce the predictable outcome of indicating completion of a task via the use of a counter.

**Response to Arguments**

6. Applicant's arguments with respect to claims 1-9 and 18-28 have been considered but are moot in view of the new ground(s) of rejection provided in response to applicant's amendment submitted 08 May 2008.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GARY W. CYGIEL whose telephone number is (571)270-1170. The examiner can normally be reached on Monday through Thursdays 12:00pm-2:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung Sough can be reached on (571)272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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GWC 7/19/2008

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